# Hamilton Energy Consulting

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## Submission in response to the Draft Tasmanian Energy Strategy.

## 1. Introduction.

My qualifications are in physics. Following a career as an occupational hygienist, I moved to Tasmania where I have a small energy consulting practice and work as a volunteer in community organizations. Energy has long been of interest to me, and my last two decades as an occupational hygienist were spent in energy industries, mainly working for ExxonMobil.

Both the community organizations I am involved in have an energy connection:

- I am currently the Convenor of the Tasmania North Branch of the Alternative Technology Association (ATA). The ATA is an Australia-wide association whose mission is to encourage, assist and advocate for more sustainable living, with particular emphasis on energy efficiency and water conservation. Please see www.ata.org.au for more information.

- I am the Chairman of Dorset Renewable Industries (DRI), which is a community focussed enterprise aimed at developing new industries for the Dorset region of North East Tasmania which utilize the region's renewable resources in ways which makes the community more resilient and improves the environment. One of the opportunities which DRI is looking at is a 30 Ml/yr cellulosic ethanol plant using a process under development in Australia.

Despite the above two connections, the views in this submission are entirely my own and not those of either the ATA or DRI.

## 2. Overview.

The Tasmanian Government are to be congratulated on their plan to formulate an energy strategy which looks ahead twenty years and which is periodically refreshed as circumstances change. They are also to be congratulated for the multi-stage consultative process they are using to develop the strategy. I was one of those who made a submission in response to the 2014 Energy Strategy Issues Paper, and was pleased to see improvement in the breadth of treatment from the Issues Paper to the Draft Strategy.

Conventional (neo-classical) economics does not treat energy as a separate input to the economy, and this is very unfortunate, as it has led to a failure to understand the central role that access to cheap and convenient energy has played in the development of industrial civilizations. If access to the energy sources we now use were somehow cut off overnight, I expect our industrial civilizations would collapse. I make this point not to be alarmist, but to reinforce the central role of energy, and hence the importance of the Tasmanian Energy Strategy.

Some aspects of the draft Strategy are excellent. The commitment to renewable energy in the State is very welcome, as is the commitment to energy efficiency. However, the latter commitment is tempered by the fact that it is very unclear what forms of energy are to be included in that commitment to energy efficiency.

Another strength in the Strategy is the plan to strengthen Government oversight of the State-owned electricity businesses to ensure that downward pressure is put on electricity prices. I would like to see "in Tasmania" added to the previous statement, as I have no difficulty with those businesses maximising the profits they earn outside Tasmania. I was disappointed to read in the Expert Panel's report that the move to establish independent Boards for those businesses had made Governments more reluctant to oversee their operations; these businesses are owned by us, the people of Tasmania, and it is to be expected that our elected representatives should closely oversee the businesses owned by the people who elected them.

## 3. Terminology.

The draft strategy appears in many places to use the word "energy" when a specific energy type – electrical energy – appears to have been the subject of the discussion. This is not just a matter of terminological exactitude, there are good reasons for being very careful in the final Strategy to only use the word "energy" when all common forms of energy are being discussed. Those reasons are:

1. **Clarity**. Why write about a policy proposal using the word "energy" which a reader might suppose will apply to, say, firewood, when there is no

intention of applying it to anything other than electricity? Here is an example from the Minister's foreword: *"…The Government is identifying a series of actions that include improving the efficiency of the electricity supply industry in Tasmania to ensure Tasmanians are getting the most affordable and reliable energy sector possible …"* Does this mean that the Government is, or is not, worried about the affordability and reliability of Tasmania's firewood supply?, the aviation fuel supply?, or other non-electrical energy sources?

2. **Leadership**. Energy policy involves much more than electricity, but by constantly using "energy" when they mean "electricity", policy makers can lull members of the public into thinking that once electricity issues are settled there is nothing more to do in the energy policy area. Policy makers lead the public to greater depth of understanding in a policy area by using clear, consistent and correct terminology. Muddled thinking does no one any good.

3. **Manage expectations**. Policy makers know that policy development will not fix every problem in an area. It is very important, therefore, for policy makers to manage expectations about what will or will not be addressed by using the correct terminology. If a policy is to only apply to electricity, then use the word "electricity" everywhere and do not use "energy".

4. **Credibility**. Energy policy is an academic discipline in its own right, and policy makers lose credibility if they use incorrect or muddled terminology.

Section 3.5 of the Strategy starts with the sentence: "On average Tasmanians spend more on transport fuels than household energy." This is a great example of this terminological problem. If "household energy" includes the liquid fuels purchased by the household — which it clearly could — then the sentence is a logical absurdity. My preference would be for the sentence to read: "On average

Tasmanians spend more on transport energy (liquid fuels) than they do for household electricity," which I think was the intended meaning.

## 4. Climate Change.

My previous submission pointed out that as an issue, climate change is essentially about the continued use of fossil fuels, and I referred to the International Energy Agency's advice from 2012 that no more than one-third of the then current reserves of fossil fuels could be burned prior to 2050 if the no more than 2°C warming target is to be achieved.

These considerations have not gone away: as the world has continued to fail to reduce emissions of greenhouse gases, the need to take strong action has become more urgent. In the abstract of "The geographical distribution of fossil fuels unused

when limiting global warming to 2 °C", *Nature* **517**, 187–190 (08 January 2015), Christophe McGlade and Paul Ekins (University College, London) state:

> "Policy makers have generally agreed that the average global temperature rise caused by greenhouse gas emissions should not exceed 2 °C above the average global temperature of pre-industrial times. It has been estimated that to have at least a 50 per cent chance of keeping warming below 2 °C throughout the twenty-first century, the cumulative carbon emissions between 2011 and 2050 need to be limited to around 1,100 gigatonnes of carbon dioxide (Gt $CO_2$). However, the greenhouse gas emissions contained in present estimates of global fossil fuel reserves are around three times higher than this, and so the unabated use of all current fossil fuel reserves is incompatible with a warming limit of 2 °C. … Our results suggest that, globally, a third of oil reserves, half of gas reserves and over 80 per cent of current coal reserves should remain unused from 2010 to 2050 in order to meet the target of 2 °C."

Deciding the policy response to the threat of climate change is in principle very simple: as the threat arises because of the accumulated carbon dioxide in the atmosphere because of the burning of fossil fuels, then we need to stop burning fossil fuels. Climate change is an energy issue.

The Issues Paper made no mention of climate change at all, an astonishing weakness. The draft Strategy (page 4) does at least mention climate change, but only to dismiss it from consideration in the Energy Strategy, stating that climate change will be considered in a separate action plan being developed by the Tasmanian Climate Change Office.

While an improvement from the Issues Paper, this approach is totally unacceptable.

Climate change is the energy issue; developing an energy strategy without having climate change front and centre means that both energy policy and climate change policy will be deficient and will not meet the great need for good policy in this area. A single public service group should deal with all forms of energy and with climate change, and should report to a single Minister.

I see two possible paths for the Energy Strategy to take:

1. Do it properly — integrate climate change and energy policy and start moving Tasmania towards a fossil-fuel free future. The sooner we start on that difficult transition, the better.

2. Admit defeat, and change the name of the document to Electricity Strategy. Most of the document is about electricity anyway, and if the non-electricity bits were removed, not too many people would notice.

I said "admit defeat" in the second option, because electricity is the easy part in Tasmania, compared with the hard part – getting off oil and gas. The reality is that we have no choice, in 20 years' time we will either:

1. Have accepted the challenge and will by then be well on the path to a very different Tasmanian economy — one which by then will have abandoned coal entirely, almost completely abandoned gas and be well on the way to abandoning oil as a fuel; OR

2. We will have done our part to having a planet with a climate that is out of control, and increasingly unpredictable and destructive; we will have realised that not only have we failed to use what little lead time we had to get off oil, but now chronic supply problems are reducing the capacity of what is left of our economy to make changes.

We need leadership. The good ship Tasmania is steering straight at the fossil fuelled climate iceberg, and our elected representatives need to show leadership and turn the ship around. I admit that the idea of phasing out fossil fuels is scary. The alternative – to live on a planet with runaway climate change – is even more scary. We need to stop refusing to notice the climate change elephant and to look it in the face and to come to terms with what we must do. I am convinced Tasmania is up for this challenge. We can acquire and apply the skills needed; we can solve problems and develop affordable approaches; we can work together to do this. What we need is leadership, and that is the role of the Tasmanian Government.

## 5. Section by Section Comments.

### 5.1 Executive Summary.

In the nine outcomes, the following questions arise:

- In outcome 4, does the objective include all sources of energy? If that is intended, what steps are planned to make Tasmania's supply of petroleum products "safe, secure and reliable"? Firewood is currently a very significant source of energy for Tasmanian households, but is not mentioned anywhere in the Strategy. How will this outcome apply to firewood?

- In outcomes 5 and 6, there is a reference to "power prices" which I assume means "electricity prices", and then a reference to "energy efficiency". Is this reference to energy efficiency limited only to the efficiency of electricity usage?

- In outcome 7, assuming the "energy" in this outcome is all forms, and not just electricity, how does the Government intend to reduce the cost of firewood, given that firewood is not mentioned anywhere in the Strategy?

## 5.2 Introduction.

Towards the bottom of the second column on page 3 there is a paragraph which starts: "The Strategy recognises that the world is beginning the transition to a low carbon future .." It is excellent that the Strategy has that recognition; but there are several problems:

1. The approach in this paragraph is too passive, as if the transition is a general trend that Tasmania just needs to stay up with. The reality is that what trend exists is too slow to protect our climate, and that the sooner the transition is embarked upon, the more time there will be available to make it, and the less disruptive it will be.

2. Tasmania already has a low emissions electricity system and a target for making it a zero emissions system would not be too hard to achieve, so why not do it?

3. The very next paragraph talks about growing the market for gas. What part of "getting off fossil fuels" did the writers of the draft Strategy not understand?

4. The phrase "transition to a low carbon future" means the same as "getting off fossil fuels", but to many readers, the former sounds soft and fluffy and rather like motherhood, while the latter conveys the reality of what we need to do. Show some leadership! Tell it like it is!

## 5.3 The growth of Solar PV and the "death spiral".

The draft Strategy discusses the potential for the development of an electricity "death spiral" and the related development of solar PV in sections 3.2 and 3.4. The resulting actions are fairly vague such as the "introduction of cost reflective tariffs in the small customer market" and are unexceptional. I think the discussion should have also considered two important questions:

1. Is it desirable for customers to disconnect from the electricity grid?

2. If the answer to #1 is No, then what actions could be taken to minimise the number of defections?

There are clear economic reasons why grid defections are a bad thing, and in Tasmania there are also environmental and community resilience reasons why grid defections are bad. The Tasmanian grid is in many ways like a battery: if I export renewable electricity to the grid from a small PV, wind or biogas plant, then water that would otherwise have flowed downhill to generate the electricity that I supplied to the grid stays up the hill and is available to flow down the hill at some other time. This increases the value of the exported electricity and helps to

drought-proof the Tasmanian grid. I therefore submit that in Tasmania the answer to the first question is a very definite No.

Having decided that grid defections are to be discouraged, the question then becomes, how? Punitive approaches are not likely to work very well — the carrot is more likely to be effective than the stick. This is an area in which some careful market research could be helpful; my personal opinion is that the fairest arrangement would be a 1:1 feed-in tariff minus a network transport fee, expressed as a percentage. Given that electricity I feed in to the grid is likely to be used locally, I think it would be reasonable to pay a network transport fee of somewhere around 10% of a 1:1 tariff. The objective of the actual quantum of the network transport fee would be to minimise defections, not to achieve some kind of pricing economic purity. Bills should show a credit for the 1:1 feed-in tariff and then subtract the network transport fee off that credit. The network transport fee should be smaller for renewable electricity than for non-renewable electricity; in a time of day pricing regime, the time of day pricing would apply in both directions, with the same percentage network transport fee being charged for electricity fed into the grid regardless of the time of day. I would like to think that most of my fellow Tasmanians would regard such an arrangement as fair, and would support it by not defecting from the grid when they could.

### 5.4 Petroleum fuels.

Liquid petroleum fuels are discussed in sections 3.5 and 4.1.7. These sections are a huge improvement on the Issues Paper. My concern with these two sections is essentially that the approach is too passive, and the actions canvassed, while good, are too unambitious. In addition, there is a major community communication and leadership issue in this area which is not addressed.

Examples of the passive nature of the approach are:

1. In the first paragraph of 4.1.7: "The Government … acknowledges that a move away from our dependency on petroleum fuels will largely be a result of technological innovation and market forces rather than regulatory intervention." If the Government allows this to be true by its own inaction, then it will have failed to provide leadership.

2. In the last paragraph of 4.1.7: "While there are limited opportunities for Government to significantly impact the Tasmanian economy's reliance on petroleum fuels, there is value in continuing to improve the efficiency of the transport fleet and promote the greater use of public transport." Of course the last two actions are of value; my concern is the defeatist attitude in the first part of the sentence.

The discussion of electric vehicles ignores reality: in the third paragraph of 4.1.7 I says: "it is a distinct possibility that electric vehicles will be cost and performance competitive within the term of this strategy". I have news for you: electric vehicles are here now. Last year, my wife and I purchased a Mitsubishi Outlander PHEV, a plug in hybrid electric vehicle. We are delighted with our purchase, and on average about half our travel is done using electrical energy, with a tank full of petrol (less than 40 litres) comfortably taking us more than 1,000 km.

The actions listed in 4.1.9 in fact only have two items relevant to reducing dependence on liquid petroleum fuels: #20 "Undertake a pilot program to help Government and private sector vehicle fleets reduce their fuel and operational costs" and #21 "Increase the efficiency of public transport through system improvements". Here are some suggested additional actions:

- A review of the energy content of high school and TAFE curricula to ensure that students have the necessary knowledge and skills to make energy decisions.

- A review of driver licence training and testing to ensure that new drivers know how to drive in a fuel-efficient way.

- A revenue neutral "feebate" system should be applied to vehicle registrations to provide incentives for the most efficient vehicles in a weight class and a disincentive for the least efficient. I understand that such a system has been a great success in France.

- Strong support at the COAG level for Australia to introduce mandatory vehicle energy efficiency requirements.

- Initiate research into duel or multi-fuelled tractors and other agriculture equipment.

- Initiate research into appropriate crops for farmers to grow as feed stock for biodiesel or direct use in multi-fuel tractors.

- Provide suitable encouragement and incentives for the installation of public electric vehicle charging stations: according to ChargePoint, there is only one such charging station in the whole of Tasmania.

- Require the TT Line to provide electric vehicle charging on the Spirit of Tasmania ferries.

- Move the Government fleet to plug in hybrid and full battery electric vehicles over the next vehicle replacement cycle, including Ministerial vehicles.

- Consider an ethanol mandate for petrol in Tasmania.

- Continue with the redevelopment of the Tasmanian railways.

- Allow electric bicycles to have 500W motors without a speed limitation, or 1,000W motors if a 20 km/hr speed limiter is fitted to the motor control system.

Finally, the most important action the Tasmanian Government can take is to start talking to Tasmanians about this issue. Here is a rough sample of the kind of statement the Premier could make:

> *My fellow Tasmanians, our society has arrived at a key moment in our history. The science is clear: climate change is real, it poses great risks to our children and our grandchildren if we do nothing. We are already seeing changes in our climate, and our scientists tell me that more changes are already locked-in. These changes are not positive. We need to face up to the truth: we are doing this to ourselves through our use of fossil fuels. That's right, every time we use petrol, diesel, natural gas, coal, aircraft fuel or marine diesel we are adding to the load of carbon dioxide in the atmosphere which is changing the climate. So that is our challenge: we need to stop using those fuels. We need to phase out our usage of petrol, diesel, gas, coal and so on. This is an enormous challenge. Currently, almost everything we do involves transport fuelled by one of those fuels. The good news is that if we start now, we have years, more than a decade, to phase out those fuels. The bad news is that the longer we delay, the faster we will need to make the change, the harder the change will be to make, and the worse our climate is likely to become.*
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> *I will shortly tell you your Government's initial decisions to start this transition, but first, you need to know that we do not have all the answers; we don't have a neat 50 point plan that will take us from where we are now to where we need to be in 10 or 15 years' time. We all need to work together to meet this challenge. It effects all of us: the farmer thinking about buying a new tractor, the tourism operator thinking about a new venture based on aviation, the family looking to replace their car – all of us; this is truly a profound transition. We need to come together as a community to do this.*
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> *Amongst the Government's decisions to start this process, a few stand out. Firstly, we will stop spending money on new road projects. Existing roads will be maintained, but all spending on new roads will be diverted to public transport, whether it consists of new battery electric or plug-in hybrid buses, the return of trolley buses to our cities, or the use of a mixture of renewable fuels and electricity to power a growing public transport fleet. We will relax the rules controlling the allowable power for electric bicycles in a safety-conscious manner. We will ensure that a public electric vehicle charging network is built across Tasmania and that electric vehicle charging is available on our Bass Strait ferries. Our Bass Strait island communities will become living laboratories to test a range of approaches. The Government vehicle fleet, including Ministerial cars will convert to plug in hybrid or full battery electric vehicles as vehicles are replaced. New vehicle registration charges will vary depending on the fuel-efficiency of the vehicle, so registering the best vehicle in a class will be cheaper, and registering the worst will be significantly more expensive. These changes will initially apply only to new vehicles first registered tomorrow. The Government will look at opportunities for renewable fuels such as ethanol and biodiesel and will consider mandating*

*their use, but we have been advised that such fuels can only sustainably replace a fraction of the fuels we use now.*

*Finally, I want to say that I have complete faith in the strength and resilience of our Tasmanian community. We are up to this challenge; we can work together and over the years ahead we can learn to live prosperous lives on our beautiful island without further damaging our climate.*

The issue here is investment. Tasmanians are currently making investment decisions based on the assumption that petroleum fuels will be available to whoever has the money to pay for them. Many of those investments decisions involve the long term, and have the capacity to cause hardship when it is obvious that the fundamental assumptions about the availability of fossil fuels were incorrect. Tasmanians need to know that the future will not look like the recent past.

### 5.5 Gas.

I assume that where the draft Strategy talks about "gas" it means both pipeline gas (fossil methane) and bottled gas (fossil propane).

Given all of the above about the need to phase out our use of fossil fuels, I submit that the Strategy should not contemplate the Government's facilitation in any increase in fossil gas exploration or usage. Instead, the Government should facilitate biogas production and should mandate an open access regime for the State's gas pipeline network so that makers of biogas can sell their product into that network.

### 5.6 Energy Security.

The discussion in section 4.1.8 is very welcome, particularly the specific reference to petroleum at the end of the section. This is a marked improvement from the Issues Paper. However, none of the matters discussed in this section seem to have made it into the specific actions in the Table in section 4.1.9.

The Government owned energy businesses should be asked to report on their fossil fuel usage in their annual reports, and should be asked to also provide an estimate of how long they expect to be able to maintain generation and network reliability following a lack of supply of liquid fossil fuels. Such reporting is intended to increase the focus on whole of system resilience.

### 5.7 Energy Efficiency.

This is another area which has significantly improved from the Issues Paper to the draft Strategy. It is a big area, possibly too big to deal with adequately in the Strategy. I think that energy efficiency is crucial to our transition away from fossil

fuels: if we can achieve the desired objective by using a lot less energy than currently being used, then the transition task is so much easier. Some formal structure may assist: perhaps an Energy Efficiency Advisory Committee, some kind of knowledge sharing system (perhaps using the Web or social media), perhaps an annual Government energy efficiency statement complete with measures of the Tasmanian economy's emissions intensity. I don't have a complete plan for how this can be progressed, but I do know from my experience providing energy audits that opportunities for efficiency improvements abound. Energy efficiency is the low-hanging fruit, and deserves proper attention.

As well as those general comments, there are three specific areas which are relevant to the draft Strategy.

1. Building energy efficiency receives some attention as action 11 in the table in section 4.1.9. A recent report by Pitt & Sherry and Swinburne University of Technology into Australia's regulatory system for achieving domestic building minimum energy efficiency standards (further information available here) found gross deficiencies in how that system is operating in Australia. While the system (the building star rating system) is based on a nationally uniform set of requirements, the actual regulation is done by States, and that is what is failing. Because our building stock is turned over very slowly, ensuring this system works as intended should be a very high priority.

2. A recent report from the ATA (available here) shows that in the domestic setting, switching from gas to the most efficient electric alternative brings considerable greenhouse gas emissions reductions – particularly in Tasmania, where emissions reductions of 80% were modelled. Examples are replacing a gas hot water system with an electric heat pump hot water system, and replacing a gas cooktop with an electric induction cooktop.

3. While the draft Strategy very commendably supports strong Tasmanian involvement in a number of national schemes and systems relating to energy, it makes no mention of the Equipment Energy Efficiency Rating scheme under which household appliances have minimum performance standards and have energy rating labels attached. This is a very successful program, and deserves Tasmania's full support. Because of Tasmania's very significant reliance on firewood for home heating, the regulation of wood heaters should be reviewed to ensure that they are included in a continuous improvement and disclosure program such as the Equipment Energy Efficiency Rating scheme.

## 5.7 Bioenergy and Biofuels.

"Bioenergy" and "biofuels" refer to energy derived from material ("biomass") that was once living. Bioenergy is the more general term, and biofuels tends to refer to more transformed or engineered products, such as liquid fuels. Tasmania already uses a significant amount of bioenergy in the form of firewood. Firewood may be unregulated, unmeasured, out of fashion in energy policy circles, and very definitely unsexy, but to many Tasmanians it is their primary source of heating in winter and hence extremely important. I think it deserves consideration in the Energy Strategy.

Firewood as currently used in the majority of Tasmanian homes is not particularly efficient, nor always clean. There can be a tendency to blame the fuel for the poorly designed and operated devices in which it is used. It can be a cleaner, more efficient and more convenient fuel. In Europe and increasingly in North America the latest generation of wood-burning equipment are wood-gasification boilers. These have two combustion stages for clean burning and higher efficiency and are designed to heat water for hydronic heating and/or domestic hot water. A typical German or Austrian wood gasification boiler is fully instrumented and comes complete with automated ignition so a prepared boiler load of fuel can be automatically fired when the heat is needed. Such a boiler burns the usual chunks of wood, and is claimed to be more than 90% efficient and to have no visible smoke emissions after the start-up phase. It would be good to see the Tasmanian Government piloting the use of such equipment in appropriate settings.

The next level of fuel transformation is to use wood chips. Because of the finer division of the fuel, wood chips can be handled in bulk and fed mechanically into a suitable boiler or furnace. Wood chip boilers can be used to heat water or to raise steam for motive power or process heat, and can also be instrumented and automated and thus very convenient to operate. Wood chip fuel is the cheapest of the prepared fuels.

The next level of fuel transformation after wood chips is wood pellets. These look very much like animal feed pellets and are made from compressed sawdust. Wood pellets are a premium fuel compared with wood chips: they have a higher energy density and more predictable properties, which means that they can be burned in more compact equipment. Wood pellet boilers are also clean burning and very convenient to operate.

Wood pellets and wood chips can be made from waste materials from the forestry and wood processing industries. They can substitute for much of the bottled and pipeline gas used in Tasmania. Such substitution should be actively encouraged, and the support given to these opportunities in section 4.3.4 is very welcomed. The Government can look to very successful models from Germany and Austria of

local rural economies being transformed for the better by the substitution of fossil fuels with locally derived biomass fuels such as wood pellets and wood chips.

Wood chips and wood pellets are the low hanging fruit of bioenergy in Tasmania, and it is good to see the Government starting to develop a strategy to encourage their development. The Government should consider mandating the use of chips or pellets as a heat source in all new Government funded heat plant for Government buildings.

Biogas is a biofuel (mainly methane) formed during anaerobic digestion of organic materials such as animal manures, food processing wastes, etc. Landfill gas is an example of biogas that is already captured and used to generate electricity in Tasmania. In the rural areas of Germany and Austria, biogas is an energy source comparable to wood pellets, but their climate driven indoor animal husbandry practices may not make all their applications directly transferable to Tasmania. Nevertheless, biogas should have an increasing role. In particular, since rotting produces methane which is a much more powerful greenhouse gas than carbon dioxide, there is a strong incentive to capture and burn methane wherever possible.

Finally, there are the most elaborately transformed biofuels, the biomass derived liquids. Because there is an energy penalty for each transformation step, the more complex biofuels which most closely mimic the properties of existing petroleum fuels may not be as favourable in the longer term as more simple biofuels such as ethanol.

## 6. Summary.

The draft Energy Strategy is a considerable improvement on the Issues Paper, and I regard almost all of it as being good. My major concerns fall into two areas:

1. The absence of consideration of climate change and its implications for the continued use of fossil fuels of all sorts is the major problem in the draft Strategy. As discussed, there needs to be a complete integration of climate change and energy policy, from the public service groups to a single Minister being responsible for all energy and climate change matters.

2. The first failure leads into the second, which is the promotion of increased use of gas. Unless it is biogas, the increased use of gas is incompatible with strong action on climate change.

The draft strategy places considerable more emphasis on energy efficiency than the Issues Paper, which is an improvement. However, I think there is a lack of ambition in this area. Energy efficiency can offer major reductions in energy use.

Australia is way behind best in class examples like Germany, so there is a very large opportunity here which this Strategy does not go after as hard as it should.

Finally, the fresh approach to bioenergy is excellent. We have excellent models from rural Germany and Austria of quality technology, good systems thinking and outcomes which have transformed local economies. Those models show us that the best economic development outcomes come from small scale, diverse, locally owned and locally controlled bioenergy developments.